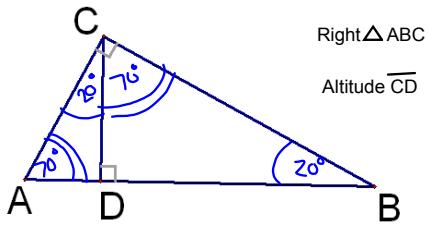
Chapter 7 Right Triangles and Trigonometry

7-1 Geometric Mean



Right △ ABC

Altitude $\overline{CD}$

What are the similar triangles?

$\triangle ABC \sim \triangle CBD \sim \triangle ACD$

$\frac{AB}{CB} = \frac{BC}{BD} = \frac{AC}{CD}$ $\frac{CB}{AC} = \frac{BD}{CD} = \frac{CD}{AD}$

$\frac{AB}{AC} = \frac{BC}{CD} = \frac{AC}{AD}$

Theorem 7-1--If the altitude is drawn to the hypotenuse of a right triangle, then the 2 triangles formed are similar to each other and the original triangle.

Geometric Mean

$\frac{r}{s} = \frac{s}{t}$ s is the geometric mean

Find the geometric mean between 3 and 8.

$\frac{3}{x} = \frac{x}{8}$ $\sqrt{x^2} = \sqrt{3 \cdot 8}$ $x = 2\sqrt{6}$ $4\sqrt{2}$

Find the geometric mean between 9 and 14.

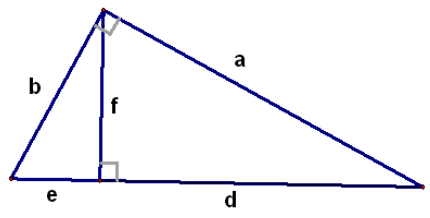
$\frac{9}{x} = \frac{x}{14}$ $\sqrt{x^2} = \sqrt{9 \cdot 14}$ $x = 3\sqrt{14}$

Do:

1.Find the geometric mean between 5 and 10. $5\sqrt{2}$

2.Find the geometric mean between 12 and 8. $4\sqrt{6}$

Ratios from the triangle.



$\frac{d}{f}=\frac{f}{e}$ $\frac{c}{a}=\frac{a}{d}$ $\frac{c}{b}=\frac{b}{e}$

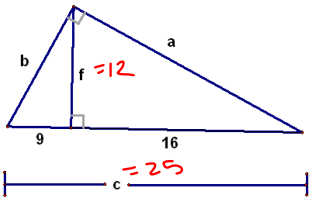
Theorem 7.2--....the altitude is the geometric mean b/w segments of hypotenuse

$\frac{BD}{CD}=\frac{CD}{AD}$

Theorem 7.3--....each leg is the geometric mean b/w the hypotenuse and the segment of the hypotenuse that is adjacent to the leg.

$\frac{AB}{AC}=\frac{AC}{AD}$ hyp. $\frac{AB}{BC}=\frac{BC}{BD}$ ← leg, leg, ← piece of hyp

Example 1

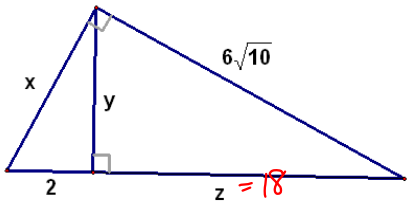


Find
a = 20
b = 15
c = 25
f = 12

$\frac{9}{f}=\frac{f}{16}$ $f^2=9\cdot16$ $f=12$

$\frac{25}{a}=\frac{a}{16}$ $a^2=25\cdot16$ $a=20$

$\frac{25}{b}=\frac{b}{9}$ $b^2=9\cdot25$ $b=15$



$\frac{2}{y} = \frac{y}{z=18}$ $\quad y^2 = 36$ $\quad y = 6$

$\frac{z+2}{6\sqrt{10}} = \frac{6\sqrt{10}}{z}$

$z(z+2) = 6\sqrt{10}\cdot 6\sqrt{10}$

$z^2 + 2z = 36\sqrt{100}$

$36 \cdot 10$

$z^2 + 2z = 360$

$z^2 + 2z - 360 = 0$

$(z+20)(z-18) = 0$

$z \neq -20 \quad z = 18$

HW
p346
20-23, 26, 28, 30

Keep answers in simplified radical form.